

DOCUMENT RESUME

ED 392 608

SE 057 768

TITLE Improving Mathematics Achievement for All California Students: The Report of the California Mathematics Task Force.

INSTITUTION California State Dept. of Education, Sacramento.

REPORT NO ISBN-0-8011-1245-1

PUB DATE 95

NOTE 31p.

AVAILABLE FROM California Dept. of Education, P.O. Box 271, Sacramento, CA 95812-0271 (\$4.50 plus shipping and handling; California residents add sales tax).

PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.

DESCRIPTORS *Educational Change; Elementary Secondary Education; *Mathematics Achievement; *Mathematics Instruction; Parent Role; State Standards; Student Evaluation

IDENTIFIERS *California; *Reform Efforts

ABSTRACT

This document is the result of the California Mathematics Task Force assigned to address the need to improve the mathematics achievement of California's students. Five recommendations are made and discussed: (1) The State Superintendent of Public Instruction (SSPI) must establish clear and specific content and performance standards for mathematics and work with districts and schools to make these standards achievable by all students; (2) SSPI, the California Legislature, and the Governor must move quickly to establish a stable, coherent, and informative system of assessment for all California students; (3) SSPI must take immediate steps to guarantee high-quality classroom mathematics instruction for all students by providing adequate time, adequate instructional materials, mathematically powerful teachers, and additional time during the school day and year for teachers to collaborate to help students succeed; (4) SSPI must act immediately to establish a management, research, and information system to answer basic questions about the operation and effectiveness of mathematics policies and programs, including the implementation and effectiveness of the state's "Mathematics Framework", and (5) School administrators and staffs must move quickly to work with parents to identify the responsibilities of the school and home that support the parents' role in their children's education. (MKR)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

A Call to

Education

"PERMISSION TO REPRODUCE THIS MATERIAL
IN OTHER THAN PAPER COPY HAS BEEN
GRANTED BY

T. Smith

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC):"

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as
received from the person or organization
originating it.

☐ Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official
OERI position or policy.

Improving Mathematics Achievement for All California Students

The Report of the California
Mathematics Task Force

California Department of Education
Sacramento, 1995

Improving
**Mathematics
Achievement**

for All
California
Students

The Report of the California
Mathematics Task Force



Publishing Information

Improving Mathematics Achievement for All California Students: The Report of the California Mathematics Task Force was published by the California Department of Education, 721 Capitol Mall, Sacramento, California (mailing address: P.O. Box 944272, Sacramento, CA 94244-2720). It was distributed under the provisions of the Library Distribution Act and *Government Code* Section 11096.

© 1995 by the California Department of Education
All rights reserved

ISBN 0-8011-1245-1

Ordering Information

Copies of this publication are available for \$4.50 each, plus sales tax for California residents, from the Bureau of Publications, Sales Unit, California Department of Education, P.O. Box 271, Sacramento, CA 95812-0271; FAX (916) 323-0823. See page 25 for complete information on payment, including the use of a toll-free number for credit-card purchases, and an order blank.

A partial list of other educational resources available from the Department appears on pages 23-24. In addition, the 1995 *Educational Resources Catalog* describing publications, videos, and other instructional media available from the Department can be obtained without charge by writing to the address given above or by calling the Sales Unit at (916) 445-1260.

Contents

Acknowledgments	v
A Call to Action	1
Letter from the Co-Chairs	2
Recommendations	
1.0 Rigorous, Balanced Content and Performance Standards	5
<i>The State Superintendent of Public Instruction must act immediately to establish clear and specific content and performance standards for mathematics and to work with districts and schools to make these standards achievable by all students.</i>	
2.0 Assessment	8
<i>The State Superintendent of Public Instruction, the California Legislature, and the Governor must move quickly to establish a stable, coherent, and informative system of assessment for all California students.</i>	
3.0 Quality Instruction for All Students	10
<i>The State Superintendent of Public Instruction must take immediate steps to guarantee high-quality classroom mathematics instruction for all students by providing adequate time, adequate instructional materials, mathematically powerful teachers, and additional time during the school day and year for teachers to collaborate to help students succeed.</i>	
4.0 Research to Improve Mathematics Education	15
<i>The State Superintendent of Public Instruction must act immediately to establish a management, research, and information system to answer basic questions about the operation and effectiveness of mathematics policies and programs, including the implementation and effectiveness of the state's Mathematics Framework.</i>	
5.0 Parents as Partners	17
<i>School administrators and staffs must move quickly to work with parents to identify the responsibilities of the school and home that support the parents' role in their children's education.</i>	
Selected Bibliography	19

Acknowledgments

The Mathematics Task Force gratefully acknowledges the contributions of educators, parents, researchers, business people, and community members to this report. Numerous individuals took the time to share their concerns by mail and telephone about California students' mathematics performance. Educators from the public schools, universities, and nonprofit sector made presentations at the Task Force meetings. The wide range of viewpoints on mathematics education represented by these presenters provided valuable input to the deliberations of the Task Force. All of these comments and information were very helpful in assisting the Task Force to set priorities for advancing student performance in mathematics.

California Mathematics Task Force

Ruth Uy Asmundson

Member of the Board of Education
Davis Joint Unified School District

Gerviece Brown

Principal
Jean Callison Elementary School
Vacaville

James R. Brown, Co-chair

Superintendent
Palo Alto Unified School District

Marvin Brown

Principal
Culver City Senior High School

Ruth Cossey

Professor of Education
Mills College

Dan Condrón

Director of Public Affairs
Hewlett Packard

Tom Crawford

Superintendent
Sonoma County Office of Education

Philip Daro, Co-chair

Director for Assessment Development
for New Standards
University of California

Kathryn Dronenburg

Member of the California State Board
of Education

Shelley Goldman

Research Scientist
Institute for Research on Learning

Jose Gutierrez

Professor of Mathematics
San Francisco State University

Jim Henderson

Director of Programs
IBM

Cheryl Hightower

Assistant Superintendent
Alameda County Office of Education

Janice Howard

Mentor Teacher
John Ehrhardt Elementary School
Elk Grove

Michele Lawrence

Superintendent
Paramount Unified School District

William J. Levinson

Superintendent
Tamalpais Union High School District

Billye Raye Lipscomb

Superintendent
Old Adobe Union Elementary
School District

Judie Lowman

Teacher
Masuda Middle School
Fountain Valley

Ella Miyamoto

Vice President of Education
California State PTA

Karen Norell

Parent
Hayward

Sally Parker

Teacher
Salinas High School

Ray Reinhard

Liaison, Governor's Office of Child
Development and Education

Elaine Rosenfield

Teacher, Sunnyside Elementary School
Los Osos

Alan H. Schoenfeld

Professor, School of Education
University of California, Berkeley

James Stigler

Professor of Psychology
University of California, Los Angeles

Sharon C. Tucker

Superintendent
Visalia Unified School District

Department of Education Support

Tej Pandey, Coordinator

Glen Thomas, Overall Support

Janice Lowen Agee, Report Development

Robert Anderson, Report Development

Sandi Adams

Valarie Bliss

Danae Luke

Becky Newland

Ruben Ortegon

Kristin Palmquist

Debbie Sweat

A Call to Action

IN APRIL 1995, STATE SUPERINTENDENT OF PUBLIC Instruction Delaine Eastin appointed the California Mathematics Task Force to address the need to improve the mathematics achievement of California's students. The urgency for immediate action was underscored by increasing evidence that the state's student performance in mathematics trails that of students in many other states in the country as well as that of other developed nations. This continuing trend, if left unchecked, could leave California's children handicapped for years to come. Their ability to compete successfully in the worldwide economy, which demands a high degree of mathematical literacy, will be in jeopardy.

Superintendent Eastin's charge to the Task Force was to develop recommendations leading to increased student achievement in mathematics. Her message was clear and emphatic. She called for action:

Let's do what needs to be done to turn education in mathematics around—to prepare all of California's children for success in the future by providing them with the knowledge and skills they will need. And let's do it now.

She challenged the Mathematics Task Force to identify steps that would begin to improve the achievement of all students in this important subject. She convened a Task Force representing a cross section of parents, business leaders, mathematics educators, school administrators, and kindergarten through twelfth grade (K-12) teachers to recommend actions which will improve mathematics achievement both immediately and in the future. In what follows, the Task Force recommends a broad series of actions that are designed to improve the quality of mathematics instruction for all students across the state.

The Task Force report that follows is a clear call to action. If we have the will to act on these specific recommendations, then education in mathematics will begin to improve—and continue to improve for years to come.

Dear Superintendent Eastin,

We are pleased to submit the following recommendations in this report.

The critical issue for our Task Force has been determining how to improve mathematics achievement of all California students. We could have defined the issue differently—old math versus new, old teaching strategies versus new, or the influence of the 1992 California *Mathematics Framework* on mathematics achievement. We didn't. Blaming parents, teachers, a framework or, worse yet, students for poor mathematics performance is not the answer. Instead we chose to stay focused on the issue of mathematics achievement—how to help all students acquire knowledge, skills, understanding, and problem-solving abilities necessary in today's world and in the future.

It is most likely that the mathematics content of today's California classrooms reflects some combination of the 1985 and 1992 mathematics frameworks, emerging state and national standards, textbooks, local expectations, the current state of knowledge on learning and instruction, and teacher expertise. Regrettably, the Task Force realized that it has insufficient research evidence to tell us specifically how these factors have been implemented and to what extent. Consequently, we have chosen to identify those factors that we can influence and which can make a difference. These include clear standards, assessment, professional development, instructional materials, and the attitude toward parent collaboration evidenced by school personnel.

We acknowledge that considerable effort has been expended to improve the quality of mathematics education in California over the last ten years. The 1985 California *Mathematics Framework* specified seven strands of content that should be included in a successful mathematics program: (1) number, (2) measurement, (3) geometry, (4) patterns and functions, (5) statistics and probability, (6) logic, and (7) algebra. In addition, the 1985 *Framework* emphasized students acquiring mathematical power, which involves the ability to discern mathematical relationships, reason logically, and use mathematical techniques effectively.

The 1992 revised California *Mathematics Framework* helped to expand students' understanding of mathematical concepts and mathematical thinking and the ability to use a variety of mathematical tools and techniques appropriately. Further, it broadened the idea of mathematical power to include an emphasis on students' communicating their mathematical thinking effectively. The *Framework* also identified instructional strategies that produce mathematically powerful students and added an eighth strand, discrete mathematics.

However, these actions have not been enough. Mathematics achievement is not improving, and there is a high degree of uncertainty about whether or not the content of mathematics programs and the instructional strategies are producing success for all students, given the current state of teacher expertise in mathematics. While we believe that the 1985 and 1992 frameworks have helped identify important issues related to mathematics achievement, as well as content and instructional strategies leading to student success, we believe that mathematics achievement is unacceptably low and that the condition of uncertainty must be removed.

This Task Force believes much of this uncertainty is due to lack of clarity about the importance of the balance of basic skills, conceptual understanding, and problem solving in any comprehensive mathematics program. The Task Force also believes the concept of balance should be applied to the instructional strategies used by classroom teachers.

By calling for balance, the Task Force opposes another pendulum swing that has worn out the patience of many teachers and parents. Our recommendations aim to build on past accomplishments, learn from experience, and move forward.

These recommendations are addressed to you, as State Superintendent of Public Instruction. The *Framework*, instructional materials, instructional strategies, professional development programs, and other areas must be evaluated in light of the concept of a balanced and rigorous mathematics program. State, district, and local documents and processes must be aligned as necessary to the concept of balance.

The Task Force makes the following five recommendations:

- 1.0 The State Superintendent of Public Instruction must act immediately to establish clear and specific content and performance standards for mathematics and to work with districts and schools to make these standards achievable by all students.
- 2.0 The State Superintendent of Public Instruction, the California Legislature, and the Governor must move quickly to establish a stable, coherent, and informative system of assessment for all California students.
- 3.0 The State Superintendent of Public Instruction must take immediate steps to guarantee high-quality classroom mathematics instruction for all students by providing adequate time, adequate instructional materials, mathematically powerful teachers, and additional time during the school day and year for teachers to collaborate to help students succeed.
- 4.0 The State Superintendent of Public Instruction must act immediately to establish a management, research, and information system to answer basic questions about the operation and effectiveness of mathematics policies and programs, including implementation and effectiveness of the state's *Mathematics Framework*.
- 5.0 School administrators and staffs must move quickly to work with parents to identify the responsibilities of the school and home that support the parents' role in their children's education.

The status quo in mathematics achievement is unacceptable. You convened the Mathematics Task Force because the status quo jeopardizes the future of today's students. To change it requires bold action that many may call "unrealistic," but this change is essential. We applaud your will to change and sincerely hope all stakeholders will join you to make high achievement in mathematics the new reality for all California students.

Jim Brown and Phil Daro, Co-chairs
California Mathematics Task Force

Recommendations

1.0 RIGOROUS, BALANCED CONTENT AND PERFORMANCE STANDARDS

The State Superintendent of Public Instruction must act immediately to establish clear and specific content and performance standards for mathematics and to work with districts and schools to make these standards achievable by all students.

1.1

Content and performance standards, K-8

The Task Force recommends that the State Superintendent of Public Instruction act immediately to establish clear and specific mathematics standards describing expectations of what students should know and be able to do at each grade level, from kindergarten through grade eight. Mathematics standards should:

- reflect a balance of basic skills, conceptual understanding, and problem solving, as well as all eight strands included in the 1985 and 1992 mathematics frameworks: (1) number, (2) measurement, (3) geometry, (4) patterns and functions, (5) statistics and probability, (6) logic, (7) algebra, and (8) discrete mathematics;
- be comparable to those of other leading states in the nation and leading industrial nations, such as Germany and Japan;
- be developed with the involvement of teachers, parents, university mathematics educators and professors, and the business community;
- be supported by a large body of test items, tasks, and assignments, similar in content and format to those in the state assessment pool, to be used by teachers in planning and implementing instruction; and
- be clearly communicated to students, teachers, and parents.

1.2

High school graduation standards

The Task Force recommends that the State Superintendent of Public Instruction and the California Legislature act to ensure that standards for high schools reflect what students are expected to

know and be able to do as a condition of receiving a high school diploma. The standards for high school graduation should include the ability to use algebraic ideas and other concepts from the eight strands of mathematics. In high school:

- all mathematics courses should be of high mathematical quality;
- all students should be expected to take at least three years of mathematics coursework to graduate. The content of each course should be mathematically rigorous, regardless of intended career options;
- mathematics instruction should emphasize a balanced program in content, which includes basic skills, conceptual understanding, and problem solving involving a variety of strategies learned from direct instruction and exploration;
- all students should meet the standards established on a statewide examination (to be developed) for high school graduation. Students should take this exam in grade ten and, if they do not achieve the standards, they should be required to retake the exam in grade eleven and, if necessary, again in grade twelve. **If they do not pass, they do not graduate;** and
- appropriate instruction should be provided to students who do not speak English or who have physical or learning disabilities so that they can meet the same high standards.

1.3

Making mathematics standards achievable by all students

The Task Force recommends that schools provide all students with full and open access to classes in mathematics; students should be encouraged to take as much mathematics as possible. Districts, school boards, high school administrators, and teachers must:

- examine the use of ability grouping, course prerequisites, and mathematics course content to ensure that all students have access to the full range of options throughout their educational experience;
- ensure that all options for school mathematics be made available to all students, that those options are clearly communicated to students and parents, and that honors and advanced placement courses be open to all students who wish to attempt them; and
- make provisions to support students who are not likely to be meeting performance standards by offering such strategies as after- and before-school study groups, mathematics labs, or tutoring in the evenings or on Saturdays. A balanced mathematics program is as important for these students as any others.

1.4**Standards and curriculum development at the district and school level**

The Task Force recommends that districts and schools augment state content and performance standards to reflect local priorities for students' mathematics learning based on discussions with parents, teachers, community members, and the school board. Districts are encouraged to work with other districts and county offices of education in developing their mathematics curricula.

2.0 ASSESSMENT

The State Superintendent of Public Instruction, the California Legislature, and the Governor must move quickly to establish a stable, coherent, and informative system of assessment for all California students.

2.1

A coherent and consistent assessment system

The Task Force recommends that the state assessment system:

- be fully consistent with the content and performance standards delineated in Recommendation 1.0;
- provide, at the minimum, information regarding student performance at the grade, school, district, and state levels;
- provide information relative to national and international assessments;
- be in place for at least seven to ten years in order to provide consistent benchmarks for performance and information useful to improving instruction; and
- assess all students, regardless of any lack of English skills or physical or learning disability (except for the most severely handicapped), with appropriate instruments and hold them to the same high standards as others.

2.2

Public availability of assessment items

The Task Force recommends that the state contract with test publishers to develop a large pool of test items, tasks, and assignments which, when appropriately chosen, would provide a balanced assessment of basic skills, conceptual understanding, and problem solving in the eight strands of mathematics. These items should be made available to parents, students, and teachers to exemplify curriculum and assessment goals and provide a means by which all stakeholders can work directly on the mathematics that "counts." The items on the state assessment will be chosen from this pool.

2.3

Annual matrix-sampled testing at specified grade levels

The Task Force recommends that each year a subset of the tasks, or tasks similar to the item pool, should be used, via matrix sampling, as the annual California mathematics assessment for grades 3, 5, 8, and 10. Assessment results should be compared with data

from national and international assessments. For purposes of accountability, the results should be released, describing levels of achievement in mathematics, by grade level, school, district, and for the state for a balanced curriculum in each of the eight strands.

2.4 Systematic monitoring of achievement at the local level

The Task Force recommends that school districts regularly monitor student achievement in mathematics at the individual, classroom, and school levels. As part of this assessment system, teachers, schools, school districts, and parents should have access to the large pool of test items which represent a balanced mathematics curriculum and be able to use them on an ongoing basis for classroom assessments. This procedure would give a straightforward method of providing students with continuous feedback regarding their mathematical performance and for checking schoolwide and districtwide progress toward meeting the statewide standards.

2.5 Development of a knowledge base linking achievement and instructional practices

The Task Force recommends that the information gathered from the assessments, at the state level and over a period of years, should serve as part of a knowledge base to provide better understanding of the kinds of instruction that would lead to improved student performance and to help improve instructional practices.

2.6 Transitional assessment

The Task Force recognizes that it will take time to move toward a comprehensive state assessment system that measures the degree to which students, grade levels, schools, school districts, and the state are reaching statewide performance standards for a balanced mathematics curriculum. In the meantime districts should make the best use of available assessment materials for measuring individual student achievement. Reports of individual results should continue to be made available to students, parents, teachers, and the school, while protecting the confidentiality of each student's personal academic record. The Task Force further recommends that the state evaluate those tests in terms of criteria, described in Recommendation 2.1, to assist districts in the use of available assessments and to move toward the modification of such assessments to reflect the goals of curriculum balance.

3.0 QUALITY INSTRUCTION FOR ALL STUDENTS

The State Superintendent of Public Instruction must take immediate steps to guarantee high-quality classroom mathematics instruction for all students by providing adequate time, adequate instructional materials, mathematically powerful teachers, and additional time during the school day and year for teachers to collaborate to help students succeed.

3.1

Adequate time for instruction

The 1992 National Assessment of Educational Progress Report Card for California reported that only 70 percent of the fourth-grade students received four or more hours of mathematics instruction per week. The actual time for instruction is further reduced by frequent interruptions for various nonacademic purposes.

The Task Force recommends that the State Superintendent of Public Instruction, local school boards, district superintendents, and principals act to ensure that schools:

- provide each elementary student with 300 minutes per week of instruction in mathematics to meet the standards described in Recommendation 1.0;
- make uninterrupted instructional time for mathematics a priority at every grade;
- extend learning time for mathematics by using appropriate and relevant homework assignments; and
- provide before-school, after-school, and lunch-time mathematics programs and planned intervention, such as alternate instruction, smaller class groupings, and tutoring for students needing additional time or support.

3.2

Adequate instructional materials

Every child and every teacher has a right to a full complement of instructional materials, including textbooks, manipulatives, and technology. It is time to go beyond pilot projects and grant proposals; we must now ensure access to these mathematics tools in every classroom. The lack of up-to-date instructional materials in California's classrooms threatens many students' opportunities for high achievement. Adequate and appropriate instructional resources are critical to support mathematically rich teaching and learning.

The Task Force recommends that:

- the State Superintendent of Public Instruction propose legislation to increase funding specifically allocated to purchase adequate educational technology for all students, including computers, calculators, and multimedia equipment;
- local school districts allocate sufficient funds so that each classroom has full access to instructional materials, including enough textbooks and other materials for each student;
- the State Superintendent of Public Instruction, the California Legislature, and the Governor support a statewide bond initiative to "jump-start" the use of technology in California's mathematics classrooms;
- the State Superintendent of Public Instruction provide guidelines to schools regarding appropriate use of educational technology in mathematics. These guidelines should include (1) performing simple arithmetic computations without the use of calculators and (2) using calculators for complex computations and challenging mathematical problems; and
- the State Superintendent of Public Instruction inform local school districts that they should select materials that reflect a balanced mathematics program from California State Board of Education-adopted materials. School districts should also review other materials as necessary to see which best support the concept of balance and meet the specific needs of their students. Districts should be routinely informed that there is a waiver process if they have unique needs or seek to adopt materials other than California State Board of Education-adopted textbooks.

3.3

Mathematically powerful teachers for all students

For sustained improvement in student achievement to occur in California, every classroom mathematics teacher must know mathematics and how to teach it.

Teachers' mathematical power rests on foundations of solid mathematical knowledge and appropriate instructional strategies. This means that teachers themselves should have deep understanding of mathematical content and possess conceptual understanding and problem-solving abilities related to the topics they teach. They should keep current on research regarding how students learn skills and concepts and solve problems. Teachers must receive high-quality mathematical and pedagogical preparation before they enter the classroom, and this preparation must incorporate work in

number, measurement, geometry, patterns and functions, statistics and probability, logic, algebra, and discrete mathematics.

Mathematically powerful teachers recognize the strengths and weaknesses of individual students. Such teachers also are able to challenge students who learn in a variety of different ways with relevant problem-solving activities, can help those who have failed to succeed during previous instruction, and can provide for the mathematics learning of students who speak languages other than English or who have physical or learning disabilities.

The Task Force recommends that the State Superintendent of Public Instruction take action to provide all students with teachers who know mathematics and know how to teach it by:

- requiring elementary school teachers to complete at least two high-quality undergraduate mathematics courses encompassing the spectrum of mathematical content strands to become credentialed. Examples of two such courses were specified in the 1985 California *Mathematics Framework* (pages 43-45);
- requiring secondary mathematics teachers to complete the equivalent of an undergraduate minor in mathematics to become credentialed. This should be the primary requirement rather than the current requirement, which simply involves passing a test. Credential programs must stress mathematics and knowledge of how to teach it;
- not exempting current teachers from these requirements. Any movement up the salary scale, renewal of credentials, or other incentives should be contingent on meeting these requirements;
- convening a meeting with the deans of all schools of education, the chairs of college and university departments of mathematics, the Commission on Teacher Credentialing, and current practitioners to implement a plan to meet these credentialing objectives; and
- requiring every classroom mathematics teacher to participate in an ongoing program of professional development. Research and experience show that the most effective professional development occurs in the context of long-term, ongoing programs that are school-based and subject-matter specific, provide follow-up, and involve collaboration among teachers in the planning, implementation, evaluation, and improvement of classroom instruction.

The Task Force recommends that local boards of education, superintendents, and principals support the professional preparation of administrators and teachers of mathematics and the improvement of students' mathematics achievement by:

- identifying available resources, organizations, and programs, such as the California Mathematics Project, county offices of education, California Mathematics Council Affiliates, and the California Alliance for Mathematics and Science;
- supporting school-based efforts by approving staff development days specifically for mathematics, identifying districtwide standards, providing mathematics professional development programs for administrators, and encouraging teachers in different schools to share ideas; and
- using the three-year cycle of Program Quality Reviews (PQRs) to focus on mathematics and use the PQR process as the basis for self study and a comprehensive mathematics plan which includes professional development.

These district and school efforts should include the following components:

- developing mathematical knowledge and skills, conceptual understanding, and problem solving;
- discussing mathematics issues among teachers of the same grade level and between grade levels;
- developing instructional strategies that address all types of student learning;
- assessing student understanding in basic skills, concepts, and problem solving;
- developing grade-level mathematics curricula that offer a balanced instructional program of basic skills, conceptual understanding, and problem solving;
- reviewing data on student achievement;
- studying research on the learning of mathematics;
- making changes in the mathematics program and evaluating the impact of those changes; and
- developing strategies that address specific student needs by working with individual students and small groups of students.

3.4

Time to succeed

In addition to their teaching duties, teachers have to prepare their lessons, provide feedback and help individual students outside of class, and participate in their own professional development. Currently, teachers do not have time during the workday and school year to accomplish these objectives, and this situation must be changed.

The Task Force recommends that:

- school administrators and staff investigate and implement strategies for increasing the time available for teachers to work individually with students outside of class, capitalize on each other's knowledge, plan collectively, and work jointly on instructional strategies for implementing the standards described in Recommendation 1.0;
- the State Superintendent of Public Instruction collect and disseminate successful strategies that schools devise for restructuring the way teachers' time is allocated;
- the State Superintendent of Public Instruction, the California Legislature, and the Governor act immediately to provide fiscal incentives for school districts to lengthen the school year for teachers by ten days over the next five years. These additional days would be used to increase time for teacher collaboration and to eliminate the use of staff development days as part of the 180-day student year; and
- school administrators place a high priority on training teachers who are not adequately prepared to provide instruction in the eight strands of mathematics and a balanced mathematics curriculum. In the meantime, these teachers should work with materials and strategies which they can effectively use in today's classroom.

4.0 RESEARCH TO IMPROVE MATHEMATICS EDUCATION

The State Superintendent of Public Instruction must act immediately to establish a management, research, and information system to answer basic questions about the operation and effectiveness of mathematics policies and programs, including the implementation and effectiveness of the state's Mathematics Framework.

The state's policies for mathematics education are embodied in the California *Mathematics Framework*. The Task Force was astonished, therefore, to discover that the state has no means to determine the effectiveness of these state policies. The state has collected data on student achievement but not on the processes of teaching and learning that lead to student achievement. This means that we do not know how widely or in what ways mathematics frameworks have been implemented in California's classrooms, and we therefore cannot possibly understand the roles that frameworks play in the achievement of students. This Task Force strongly believes that meaningful debate on how to improve mathematics learning is needed to make responsible future policy decisions.

4.1

Monitor the implementation and effectiveness of state educational policies

The State Superintendent of Public Instruction should work with the California Legislature to establish and allocate resources to support a new program in the California Department of Education to monitor the implementation and effectiveness of state educational policies. This program should undertake systematic observations of classroom mathematics instruction and carefully planned studies of student achievement and its relationship to other factors, and collect information from teachers regarding what does and does not work in their classrooms. This program should also act as a clearinghouse for the collection and analysis of information from other states and countries on effective mathematics instruction.

4.2

Standing advisory committee

The State Superintendent of Public Instruction should act immediately to establish a standing committee to work on the continual improvement of the California *Mathematics Framework* and state mathematics education policies. This committee should include all

relevant stakeholders and help set the agenda for the research program. It should continually monitor and interpret the results of the research. The committee should advise the State Superintendent, the Curriculum Development and Supplemental Materials Commission, and the California State Board of Education by suggesting and evaluating proposed revisions to the *Framework* and other state policies.

5.0 PARENTS AS PARTNERS

School administrators and staffs must move quickly to work with parents to identify the responsibilities of the school and home that support the parents' role in their children's education.

Parental involvement is a critical factor in increasing student achievement. For too long, too many parents have felt disenfranchised from the school system. Efforts must be made to empower parents as productive and effective partners in education. At the same time, parents must recognize their responsibility to support school programs and to provide strong support for their children's learning at home. This shared responsibility promotes the home-school partnership needed to enhance student achievement.

5.1

Informing and involving parents

The Task Force recommends that school districts and schools support a broad range of activities to inform and involve parents in the school.

Districts and schools should provide information to parents about mathematics goals, content and performance standards, course options, and assessment results. Parents should also be an integral part of every district and school committee that makes decisions affecting students. These committees have a variety of responsibilities, such as developing curriculum, selecting instructional materials and assessment instruments, and establishing district standards. Parent representatives on district and school committees should reflect the diversity of the student population. Parents can provide teachers with "time to succeed" by helping individual students outside of class and working jointly on curriculum and instructional strategies (Section 3.4).

5.2

Parents reinforcing children's mathematics learning

The Task Force recommends that schools offer opportunities for parents to participate in a variety of mathematics events for families each year. These events should provide parents a chance to experience mathematical tasks which reflect a balanced mathematics program, give parents strategies for working with students at home, and provide resources that parents can use to reinforce mathematics learning for their children.

5.3**Community support for students learning more mathematics**

The Task Force recommends that the State Superintendent of Public Instruction initiate a public relations campaign targeted at the community to stress the importance of a rigorous and balanced mathematics program at every grade level. The message needs to be that we should expect more mathematics knowledge from all of our students. It is no longer acceptable for students either to take few mathematics courses or to think that most people cannot do mathematics. Parents and the entire community need to support all students learning more mathematics.

5.4**Family-School Partnership Act**

The Task Force recommends that the State Superintendent of Public Instruction notify parents through their children's school district about the Family-School Partnership Act. This act allows parents to take off as many as 40 hours per school year from work, unpaid, to participate in their children's school activities. All parents should be encouraged to exercise this legal option.

5.5**Parents' guides to instructional materials**

The Task Force recommends that the California State Board of Education establish a policy to require publishers to develop and provide accompanying parents' guides as a condition of establishing instructional materials. The purpose of these guides should be to assist parents in monitoring and supporting their children's educational progress.

Selected Bibliography

California Public Education, 1983–1994. Sacramento: California Department of Education, 1994.

California Summary and National Reports, Advanced Placement Program. Princeton, NJ: The College Board and Educational Testing Service, 1994.

Can Students Do Mathematical Problem Solving? Results from Constructed-Response Questions in NAEP's 1992 Mathematics Assessment. Prepared by J.A. Dossey and others. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education, 1993.

Cossey, R. "Northern Section Report—Solid Ground of Math Renewal." *California Mathematics Council Communicator*, Vol. 19 (June, 1995). (Newsletter)

Cunningham, G.K. *The Kentucky Education Reform Act Assessment System.* Louisville, KY: University of Louisville, 1995.

Curriculum and Evaluation Standards for School Mathematics. Prepared by the Working Group of the Commission on Standards for School Mathematics. Reston, VA: National Council of Teachers of Mathematics, 1989.

Effective Schools in Mathematics: Perspectives from the 1992 NAEP Assessment. Prepared by Educational Testing Service, under contract with the National Center for Education Statistics. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education, 1994.

Elementary Performance Assessment, Grade 4, 1994, Report for Golden Poppy Elementary School, Calwest Unified, California. Sacramento: California Learning Assessment System, California Department of Education, 1994.

Evaluation of the Effects of Programming Arrangements on Student Learning Outcomes. Prepared by M. Delcourt and others. Research Monograph 94108. Charlottesville: University of Virginia, 1994.

Fact Book: 1994–1995. Sacramento: California Department of Education, 1994.

George, C.A., J.B. Grissom, and A.E. Just. *Program Improvement Implementation in Chapter 1 Schools: Stories of Mixed Success.* Sacramento: California Department of Education, 1994.

Gill, A. "What We Can Learn from Japanese Teachers' Manuals," *American Educator* (Spring, 1995).

High School Performance Assessment, Grade 10, 1994, Report for Granite Vista High School, Calwest Unified, California. Sacramento: California Learning Assessment System, California Department of Education, 1994.

- An Independent Evaluation of the Kentucky Instructional Results Information System.* Prepared by the Evaluation Center, Western Michigan University, Frankfort: Kentucky Institute for Education Research, 1995.
- Kentucky Instructional Results Information System (KIRIS).* Frankfort: Kentucky Department of Education, 1995.
- Kentucky Instructional Results Information System, 1992-93 Technical Report.* Prepared by Advanced Systems in Measurement and Evaluation, Inc. Frankfort: Kentucky Department of Education, 1994.
- Kentucky Instructional Results Information System, 1992-93 Technical Report, Appendices.* Prepared by Advanced Systems in Measurement and Evaluation, Inc. Frankfort: Kentucky Department of Education, 1994.
- Learning Mathematics.* Prepared by A.E. Lapointe and others. Princeton, NJ: The International Assessment of Educational Progress, Educational Testing Service, 1992.
- "Limits of Thematic Instruction," *Common Knowledge*, Vol. 7 (Fall, 1994). (Newsletter published by the Core Knowledge Foundation)
- Mathematics—A Curriculum Profile for Australian Schools.* Project of the Australian Education Council. Carlton, Australia: Curriculum Corporation, 1994.
- Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve.* Sacramento: California Department of Education, 1985.
- Mathematics Framework for California Public Schools: Kindergarten Through Grade Twelve.* Sacramento: California Department of Education, 1992.
- Mathematics Program in Japan: Kindergarten to Upper Secondary School.* Prepared by the Japan Society of Mathematical Education. Tokyo: Japan Ministry of Education, 1990.
- Measuring Counts: A Conceptual Guide for Mathematics Assessment.* Prepared by the Study Group on Mathematics Assessment, National Research Council. Washington, DC: National Academy Press, 1993.
- Middle Grades Performance Assessment, Grade 8, 1994, Report for Coastal View Middle School, Calwest Unified, California.* Sacramento: California Learning Assessment System, California Department of Education, 1994.
- NAEP 1992 Mathematics Report Card for the Nation and the States.* Prepared by I. Mullis and others. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education, 1993.
- NAEP 1992 Mathematics Report Card for the Nation and the States: Data from the National and Trial State Assessments.* Prepared by Educational Testing Service, under contract with the National Center for Education Statistics. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education, 1993.

- "New Standards, Performance Standards." Pittsburgh, PA: Learning Research and Development Center, University of Pittsburgh, 1995 (Draft 4.2).
- Olson, L. "Winning NASDC Project Takes Flight in MD," *Education Week*, Vol. 12 (January, 20, 1993).
- Parent Power: Parents as Partners in Math Learning*, Vol. 1. (Newsletter published by Creative Publications, Mountain View, California)
- Porter, A. "A Curriculum Out of Balance: The Case of Elementary School Mathematics," *Educational Researcher*, Vol. 18 (1989), 9-15.
- Rebuilding Education in the Golden State: A Plan for California's Schools*. Prepared by M.W. Kirst, G.C. Hayward, and J.E. Koppich. Berkeley: Policy Analysis for California Education, University of California, Berkeley, 1995.
- Rediscovering Education: Creating Schools for the 21st Century*. Burlingame: California Teachers Association, 1994.
- Rising to the Challenge: A New Agenda for California Schools and Communities*. Denver, CO: Education Commission of the States, 1995.
- Romberg, T., L. Wilson, and M. Khaketla. *The Alignment of Six Standardized Tests with the NCTM Standards*. Madison: Wisconsin Center for Education Research, University of Wisconsin, Madison, n.d.
- Rothman, R. "Achievement in Math Improves NAEP Data Find," *Education Week*, Vol. 12 (January 20, 1993).
- School Mathematics: Options for the 1990s, Proceedings of the Conference of the National Council of Teachers of Mathematics*. Edited by T. A. Romberg and D.M. Stewart. Madison: Wisconsin Center for Education Research, University of Wisconsin, Madison, 1984.
- Stevenson, H.W., and J.W. Stigler. *The Learning Gap: Why Our Schools Are Failing and What We Can Learn From Japanese and Chinese Education*. New York: Summit Books, 1992.
- Stigler, J.W., and H.W. Stevenson. "How Asian Teachers Polish Each Lesson to Perfection," *American Educator* (Spring, 1991).
- Thurston, W. "Mathematical Education," *Notices of the American Mathematical Society*, Vol. 37 (1990).
- Usiskin, A. "Why Is Algebra Important to Learn?" *American Educator* (Spring, 1995).
- "Wisconsin Center for Educational Research Five-Year Evaluation: An Outline," *Evaluation Update* (Spring, 1995). (Newsletter published by Interactive Mathematics Program, Emeryville, California)

Publications Available from the Department of Education

This publication is one of over 600 that are available from the California Department of Education. Some of the more recent publications or those most widely used are the following:

Item no.	Title (Date of publication)	Price
1204	Adult Education Handbook for California (1995)	\$11.50
1151	Adoption Recommendations of the Curriculum Development and Supplemental Materials Commission, 1994: Follow-up Adoption, Science (1994)	5.50
0883	The Ages of Infancy: Caring for Young, Mobile, and Older Infants (videocassette and guide) (1990)	65.00*
1163	The Arts: Partnerships as a Catalyst for Educational Reform (1994)	10/10.00†
1079	Beyond Retention: A Study of Retention Rates, Practices, and Successful Alternatives in California (1993)	4.25
1170	California Private School Directory, 1994-95 (1994)	17.50
1138	California Public Education: 1983-1994	5.00
1207	California Public School Directory (1995)	17.50
1198	California Special Education Programs: A Composite of Laws (1995)	no charge
1036	California Strategic Plan for Parental Involvement in Education (1992)	6.00
0488	Caught in the Middle: Educational Reform for Young Adolescents in California Public Schools (1987)	7.50
0874	The Changing History-Social Science Curriculum: A Booklet for Parents (1990)	12/5.00‡
1053	The Changing History-Social Science Curriculum: A Booklet for Parents (Spanish) (1993)	12/5.00‡
1143	Children's Choices: A Cookbook for Family Child Care Providers (1995)	11.95
1072	Commodity Administrative Manual (1993)	13.00
1179	Continuation Education in California Public Schools (1995)	7.25
0978	Course Models for the History-Social Science Framework, Grade Five—United States History and Geography: Making a New Nation (1991)	9.50
1034	Course Models for the History-Social Science Framework, Grade Six—World History and Geography: Ancient Civilizations (1993)	9.50
1132	Course Models for the History-Social Science Framework, Grade Seven—World History and Geography: Medieval and Early Modern Times (1994)	12.75
1180	Course Models for the History-Social Science Framework, Grade Twelve—Principles of American Democracy (1994)	15.25
1093	Differentiating the Core Curriculum and Instruction to Provide Advanced Learning Opportunities (1994)	6.50
1045	Discoveries of Infancy: Cognitive Development and Learning (videocassette and guide) (1992)	65.00*
1098	English as a Second Language: Implementing Effective Adult Education Programs (1993)	6.00
0041	English-Language Arts Framework for California Public Schools (1987)	5.50
0927	English-Language Arts Model Curriculum Standards: Grades Nine Through Twelve (1991)	6.50
1056	Essential Connections: Ten Keys to Culturally Sensitive Care (videocassette and guide) (1993)	65.00*
1124	Exemplary Program Standards for Child Development Programs Serving Preschool and School-Age Children (Spanish) (1994)	6.00
0751	First Moves: Welcoming a Child to a New Caregiving Setting (videocassette and guide) (1988)	65.00*
0839	Flexible, Fearful, or Feisty: The Different Temperaments of Infants and Toddlers (videocassette and guide) (1990)	65.00*
0804	Foreign Language Framework for California Public Schools (1989)	6.50
1116	The Framework in Focus: Answers to Key Questions About the English-Language Arts Framework (1993)	5.50
0809	Getting in Tune: Creating Nurturing Relationships with Infants and Toddlers (videocassette and guide) (1990)	65.00*
1089	Greatest Hits in Environmental Education (1993)	7.00
1083	Handbook for Teaching Vietnamese-Speaking Students (1994)	\$5.50*
1064	Health Framework for California Public Schools, Kindergarten Through Grade Twelve (1994)	8.50
0737	Here They Come: Ready or Not—Report of the School Readiness Task Force (summary report) (1988)	4.50
0712	History-Social Science Framework for California Public Schools (1988)	7.75
1154	Home Economics Education Career Path Guide and Model Curriculum Standards (1994)	17.00
1140	I Can Learn: A Handbook for Parents, Teachers, and Students (1994)	8.00
1114	Implementation of Middle Grade Reforms in California Public Schools, 1988-89 through 1992-93 (1993)	6.50
1178	Independent Study Operations Manual, 1993 Revised Edition with 1994 Updates (1994)	30.00
1055	Infant/Toddler Caregiving: A Guide to Cognitive Development and Learning (1995)	12.50

*Videocassette also available in Chinese (Cantonese) and Spanish at the same price.

†Ten copies is the minimum number that can be ordered. For more than 10 copies, the price is 70 cents each for up to 99 copies, 50 cents each for 100 or more copies.

‡Twelve copies is the minimum number that can be ordered. For more than 12 copies, the price is 40 cents each for up to 99 copies, 30 cents each for 100 or more copies.

Prices are subject to change. Please call 1-800-995-4099 for current prices.

Item no.	Title (Date of publication)	Price
0878	Infant/Toddler Caregiving: A Guide to Creating Partnerships with Parents (1990)	12.50
1057	Infant/Toddler Caregiving: A Guide to Culturally Sensitive Care (1995)	12.50
0880	Infant/Toddler Caregiving: A Guide to Language Development and Communication (1990)	12.50
0877	Infant/Toddler Caregiving: A Guide to Routines (1990)	12.50
0879	Infant/Toddler Caregiving: A Guide to Setting Up Environments (1990)	12.50
0876	Infant/Toddler Caregiving: A Guide to Social-Emotional Growth and Socialization (1990)	12.50
1196	Instructional Materials Approved for Legal Compliance (1995 edition) (1995)	16.25
1024	It's Elementary! Elementary Grades Task Force Report (1992)	7.00
1147	It's Elementary! (Abridged Version) (1994)	3.50†
0869	It's Not Just Routine: Feeding, Diapering, and Napping Infants and Toddlers (videocassette and guide) (1990)	65.00‡
1104	Just Kids: A Practical Guide for Working with Children Prenatally Substance-Exposed (1994)	8.25
1155	Kids' Time: A School-Age Care Program Guide (1994)	10.50
1107	Literature for History-Social Science, Kindergarten Through Grade Eight (1993)	8.00
1066	Literature for Science and Mathematics (1993)	9.50
1216	Martin Luther King, Jr., 1929-1968 (1995)	7.00
1033	Mathematics Framework for California Public Schools, (1992)	7.50
1183	Meeting the Challenge: A History of Adult Education in California—From the Beginnings to the 1990s (1995)	12.50
1144	Moral, Civic, and Ethical Education Handbook (1995)	9.50
1113	On Alert! Gang Prevention: School In-service Guidelines (1994)	6.50
1137	Organizing a Successful Parent Center: A Guide and Resource (1994)	4.25
1065	Physical Education Framework for California Public Schools, Kindergarten Through Grade Twelve (1994)	6.75
0845	Physical Education Model Curriculum Standards, Grades Nine Through Twelve (1991)	6.00
1119	Prelude to Performance Assessment in the Arts (1994)	8.00
1094	Program Quality Review Training Materials for Elementary and Middle Level Schools (1994)	7.50
0753	Respectfully Yours: Magda Gerber's Approach to Professional Infant/Toddler Care (videocassette and guide) (1988)	65.00‡
1118	Roads to the Future: Final Report (1994)	10.00
1117	Roads to the Future: Summary Report (1994)	8.00
1191	Safe Schools: A Planning Guide for Action (1995)	10.75
1088	School District Organization Handbook (1993)	16.00
1038	Science Facilities Design in California Public Schools (1992)	6.25
0870	Science Framework for California Public Schools (1990)	8.00
1087	Secondary Textbook Review: Mathematical Analysis, Grades 9-12 (1993)	11.50
1040	Second to None: A Vision of the New California High School (1992)	6.50
0752	Space to Grow: Creating a Child Care Environment for Infants and Toddlers (videocassette and guide) (1988)	65.00‡
1134	Teachers' Catalog of Grants, Fellowships, and Awards (1994)	5.50
1044	Together in Care: Meeting the Intimacy Needs of Infants and Toddlers in Groups (videocassette and guide) (1992)	65.00‡
0805	Visual and Performing Arts Framework for California Public Schools (1989)	7.25
1185	Volunteer Programs in California Public Schools (1994)	10.00

* Also available at the same price for students who speak Cantonese, Japanese, Korean, Pilipino, and Portuguese.

† Single price applies to quantities up to eight copies. For more than eight copies, the price is \$3.00 each for up to 99 copies, \$2.00 each for 100-249 copies, \$1.50 each for 250-499 copies, \$1.00 each for 500 or more copies.

‡ Videocassette also available in Chinese (Cantonese) and Spanish at the same price.

Prices are subject to change. Please call 1-800-995-4099 for current prices.

Order Form

To: California Department of Education
Bureau of Publications, Sales Unit
P.O. Box 271
Sacramento, CA 95812-0271

Date _____

Name _____

Address

Please send me a free copy of the current *Educational Resources Catalog*, which contains lists of instructional materials available from the California Department of Education.

City

State

ZIP code

Ordering Information

Orders in the United States can be made by check (made payable to California Department of Education), VISA or MasterCard credit cards, or purchase orders.

Please use VISA or MasterCard credit cards for orders outside the United States.

For additional information call, toll-free,

1-800-995-4099

Total number
of copiesTotal cost
of items

2

Sacramento County residents:
Please add 7.75% sales tax.

Other California residents:
Please add 7.25% sales tax.

Shipping and handling charges
(See chart.)

TOTAL AMOUNT \$

5



**VISA &
MASTERCARD
ACCEPTED**

Shipping and Handling Charges					
Total number of copies		Total number of copies		Total number of copies	
	Add		Add		Add
1-9	\$ 4.95	40-49	\$17.95	80-199	\$35.95
10-19	7.95	50-59	21.95	200-300	47.95
20-29	10.95	60-69	26.95	300-449	59.95
30-39	13.95	70-79	32.95	450+	call for information



ISBN 0-8011-1245-1